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occur in red letters at pages 17 and 18, are intended to indicate the portions to be read at those hours. They rather seem to have reference to the passages in the narrative which they follow, the first occurring after the death of our Lord, where it is said, "and it neyzed faste toward eve;" and the other where it is related, as night came on, his body was taken down from the cross.

With the exception of the first page, where the writing has been partially obliterated by damp, the manuscript is in a perfect condition, and must be regarded as a most interesting specimen of the grammatical construction and spelling of the language at the time it was written, as well as of the pictorial and caligraphic skill of a monastic scribe.

Mr. M. Donovan read a paper on the Identity of Malic and Sorbic Acids.

"Previously to my entering on the ultimate object of the present communication, I hope to be excused for making some observations on the discovery of the sorbic acid which I made many years since. In asserting my claim, and soliciting the attention of the Academy to that discovery, which has not been justly dealt with, I hope I shall not be deemed guilty of egotism altogether inexcusable. The rewards of the chemist are few; none but persons engaged in his pursuits can appreciate his toils and his disappointments. The least that can be accorded to him is the acknowledgment of his labours; for in the same proportion that we respect the opinion of the world we value its approbation.

"In the year 1785, the illustrious Scheele, having made a chemical examination of the juices of several fruits, announced the existence of a new and peculiar acid in gooseberries. Obtaining it afterwards in greater abundance from apples, he named it malic acid, and published an account of its properties, of many of its combinations, and of its preparation. Amongst other fruits, he found this acid in the berries of the

Sorbus aucuparia, or, as it is commonly called in Ireland, the mountain-ash tree. He also stated that malic acid can be formed artificially by the action of nitric acid on sugar in a certain ratio.

“ In this state Scheele’s discovery remained for thirty years, viz., until 1815 ; and about that period I made experiments on the juice of the berries of the *Sorbus aucuparia*. In the course of this investigation, so many facts presented themselves, which disagreed with the statements of Scheele, that I began to doubt the existence of malic acid in these berries; and at length came to the conclusion that the acid contained in them is essentially different. I contrived a process for preparing the new acid, which, from its source, I named sorbic, and formed many combinations with it which differed altogether in their properties from the analagous compounds prepared with Scheele’s malic acid.

“ I found that the same acid is contained in apples and some other fruits ; and as in all these Scheele had ascertained the presence of malic acid, I inferred that two acids exist in these fruits, the sorbic being a distinct and peculiar one which had escaped his observation. I was strengthened in this conviction by finding that the malic acid, furnished by the plant *Sempervivum tectorum* or houseleek, which Vauquelin proved to contain malate of lime, evinced, when combined with bases, habitudes quite different from those of the new acid. My conclusion was still further confirmed by observing that the acid produced by the action of nitric acid on sugar, which Scheele pronounced to be malic, could not by any means be made to furnish combinations similar to those of sorbic acid; that it was in fact totally different, as has since been proved by the researches of chemists. I therefore presented to the Royal Society of London a paper ‘ On the Nature and Combinations of a newly discovered Vegetable Acid,’ &c., which was published in the Philosophical Transactions for 1815: the sorbic

acid was admitted into the list of vegetable acids in all systems of chemistry published at that period.

“ In two years after (1817) M. Braconnot, a celebrated continental chemist, read a paper in the Royal Society of Nancy, on sorbic acid, which was published in the *Annales de Chimie et de Physique* (vol. vi. p. 239). In this communication he expressed his opinion that sorbic acid is different from malic and all others. He gave an economical process for preparing it, and described many of its combinations and their constitution.

“ In the same year M. Vauquelin published experiments on this subject, in the same volume of the *Annales de Chimie et de Physique* (p. 337). He, as well as Braconnot, admitted the sorbic acid to be a new and peculiar one; and declared, as the result of his inquiries, that malic acid, so far from being the only and proper acid of the berry of the *Sorbus aucuparia*, as Scheele had supposed, is not present in that fruit, he having found in it no other than the sorbic. He adopted the process given by me for preparing sorbic acid; described some of its properties and combinations, along with their analysis.

“ Braconnot, who at first admitted the sorbic to be a new acid, had, meanwhile, continued his investigations, and in 1818 announced some new facts which had caused him to modify his opinions. His paper was read in the Royal Academy of Sciences, and published in the eighth volume of the *Annales de Chimie et de Physique* (p. 149). In this paper he described a vegetable proximate principle, detected by him in the juice of the houseleek plant, which he conceived to hold a middle place between gum and sugar, and which possesses so powerful an influence in masking the combinations formed by sorbic acid that a sorbate of lead containing a very small quantity of it refused to crystallize. He adds: ‘ I believe I may conclude from my experiments that the malic acid of Scheele is composed of at least two substances, viz., sorbic acid, and this abundant mucous

matter, which is not always of the same nature. It remains to examine, with more care than has hitherto been done, the numerous variety of impure acids which have been comprised in a great number of analyses, under the name of malic acid ; it is probable that we will find in them sorbic acid, and perhaps some *other new* acids masked by this mucous principle. I am at present satisfied in the conviction of the complex nature of the malic acid obtained from the principal substances in which it is indicated, as apples, houseleek, sorbus berries, and grapes.' Elsewhere (p. 150) he says that the malic acid of Scheele contains abundant foreign matter, 'which completely masks all its properties.' From this extract we may infer it to be the opinion of Braconnot that sorbic acid is a different substance from the malic acid of Scheele, and that the latter should not be considered as a distinct acid, inasmuch as it is a compound of an acid with a large quantity of another vegetable proximate principle ; and we know that both are combined by so powerful an affinity that difficult processes are necessary for their separation.

" In my paper, published in the Philosophical Transactions, I laid claim to the discovery of a new vegetable acid, possessing properties and forming combinations quite different from those of Scheele's acid. That I established my claim was not disputed, either professedly or incidentally by the subsequent researches of Braconnot or Vauquelin. The difference between Scheele's acid and mine is so great that each was deemed *sui generis* until Braconnot's discovery of the mucous disguise. Scheele represented his malate of lead as a precipitate ; the sorbate of lead consists of strikingly beautiful crystals : his malate of potash, malate of soda, and malate of ammonia, are all uncrystallizable and deliquescent ; the sorbates of these bases are all capable of furnishing crystals which do not deliquesce : his malate of magnesia is a deliquescent mass ; but sorbate of magnesia is a crystallizable salt which is permanent in the air. Thus none of the malates, as described by

Scheele, bore the characters of the true salts, nor did the acid itself represent the true acid ; it was even confounded by him with that produced by the action of nitric acid on sugar.

“ It is true I did not perceive that sorbic acid is crystallizable, which is not to be wondered at, inasmuch as it is deliquescent ; and, even if crystallized, it would, when exposed, soon return to the syrupy consistence in which I obtained it.

“ Yet the editors of the *Annales de Chimie et de Physique*, who at that time were MM. Gay-Lussac and Arago, observing on Braconnot's experiments, give the following opinion : ‘ If it be incontestable that malic and sorbic acids are identical, justice demands that we should retain the name of malic acid given by the illustrious Scheele to the acid which he discovered in apples.’ This is very nearly tantamount to conveying the opinion that Scheele should be considered the discoverer of sorbic acid ; and if such a mode of reasoning be legitimate, then he who first made wine ought to be considered the discoverer of alcohol, and Noah would bear away honours which were earned by one who lived 3000 years after him. Admiration of transcendant talents should not extinguish justice ; the splendour of Scheele's discoveries needs not the additional glimmer of a taper. Scheele attributed to his masked and insulated acid properties essentially different from those of the sorbic. Without the aid of his discovery, I must at length have arrived at the knowledge of the sorbic acid, as my experiments were made on a different fruit ; and his inquiry, so far from aiding mine, tended greatly to embarrass it, by leading to the belief that the sorbus berries and other fruits contain another acid beside that one which I obtained. In reality, this celebrated chemist failed to discover the acid of either gooseberries, apples, or sorbs ; and as the motive of giving the name of malic acid to the compound obtained by him was, that he procured it with greater facility from apples than gooseberries, the same motive, if there were no other, should cause it to be named sorbic acid, as it is so much more easily

and abundantly obtained from sorbs, that no chemist ever thinks of preparing it from any other source. The suggestion of the Editors of the *Annales de Chimie* has not been without its effect. The authors of most of the systems of chemistry have retained the name 'malic acid,' and allude to me as one who had fallen into error with regard to its nature, instead of representing me as its real discoverer.

"The editors of the *Annales de Chimie*, &c., have made another observation which ought here to be noticed: they say: 'The experiments of M. Braconnot leave no doubt that the acid of houseleek, and *consequently* that of apples, are the same as that from sorbus berries.' Now, let us inquire what these experiments were. In Braconnot's first paper he admits that sorbic acid is a new one, different from Scheele's malic acid; he quotes my process for preparing the former, and analyzes several of its compounds. In his second paper he recounts a series of experiments on the juice of houseleek, his object being to procure pure malic acid. But during these efforts he discovered the above-mentioned mucous matter which possesses the power of masking the properties of the acid; and having found means of detecting it, he ascertained that the acid thus purified agrees, in all its properties, with the sorbic acid, contrarily to the opinion of Vauquelin, reiterated by me, that houseleek contains nothing but Scheele's malic acid. He concludes with a description of the properties of the brown mucous matter. This is the whole substance of M. Braconnot's two papers. I do not perceive how they leave no doubt that the acid of houseleek, for it was on that he experimented, 'and *consequently* that of apples,' are the same as that from the sorbus berries. Braconnot described no experiments on the acid of apples; his object was to show that the acid of houseleek possesses properties which are also exhibited by the acid found by me both in apples and in sorbus berries, thereby proving that sorbic acid may be derived from these three sources, but by no means affording any evidence that apple-acid and sorb-acid

are the same, or that apples contain no other acid. Vauquelin, it is true, ineffectually sought Scheele's acid in sorbus berries; but neither he nor Braconnot made trial of apples. The question of identity was therefore left undecided: it was still possible that malic acid, such as Scheele described, might exist in apples, along with sorbic, inasmuch as no experiments have hitherto been published which directly disprove his statements. Under these circumstances of doubt, I thought it right to undertake the inquiry; and I now purpose to adduce facts which will supply what was deficient in our means of determining the question.

“ When the juice of unripe apples is mixed with solution of acetate of lead, a curdy precipitate separates abundantly. If this be filtered off, and boiling water be allowed to run through it, the water as it passes being received in a number of vessels, it will be found that crystals will sooner or later form in several of the first vessels, and none in the last: nor will any further affusions of boiling water on the pasty mass remaining on the filter furnish a single crystal. In order to obtain a further product of crystals, the pasty mass must be decomposed by dilute sulphuric acid; the sulphate of lead is to be washed with much water, the whole to be filtered, and the clear liquor again mixed with solution of acetate of lead, which will cause a new precipitation. The precipitate, filtered off, is to be treated as before with boiling water, and the liquor received in different vessels. Crystals will form in the first vessels, and none in the last. The pasty mass is still capable of furnishing crystals by a repetition of these processes. No one before me had ever procured these crystals from apple-juice; their properties had never been investigated; the extent to which, by repetition of the foregoing processes, crystals could be produced, had never been ascertained; and, consequently, it was not known whether the whole mass is convertible into crystals, or whether a portion of it would remain uncrystallizable, which might contain an acid corresponding

with the properties that Scheele had assigned to his malic acid. This was the grand question, and conceiving that, until it be determined, the presumed identity of sorbic and malic acids is a premature and unwarrantable assumption, I undertook the inquiry in the following manner :

“ A quantity of unripe apples, sufficient to afford four gallons of juice, were crushed to a pulp, and subjected to the action of a screw-press. The juice, after standing twenty-four hours, was poured off the *fæces*, boiled, and strained. To this was added solution of acetate of lead while any precipitation ensued; the precipitate was filtered off, and allowed to drain for several days. It was then boiled, for five minutes, in two gallons of water, and the liquor was filtered while very hot. The remaining mass was again boiled in two gallons of water, and the hot liquor filtered. The boiling and filtration were repeated until both processes were performed in all six times. In the first four waters, crystals appeared after twenty-four or forty hours; in the last two there were none. The matter which remained undissolved on the filter, now incapable of furnishing crystals, was decomposed by a slight excess of very dilute sulphuric acid; and, everything soluble being washed out of the sulphate of lead, all the washings were collected, filtered, and mixed with a new portion of solution of acetate of lead. The precipitate thus produced was separated by the filter, allowed to drain well, and after being boiled in two gallons of the water which had been used in the former processes, the liquor was filtered. The pasty mass remaining on the filter was again boiled in two other gallons of the former water, and the solution filtered. This boiling in new portions of the original water, and filtering, were repeated in all six times. In each of the first four waters, after forty hours, beautiful white crystals were formed; but little in the fifth, and none in the sixth. These processes of decomposition by sulphuric acid, recomposition by acetate of lead, boiling in divided waters, filtering, and crystallizing were repeated until the original preci-

pitate from the apple-juice, by acetate of lead, was reduced to a mere trifle; new water having been, in all cases, added to compensate the loss by evaporation. As it is my intention to resume the subject hereafter, it is not necessary, in this place, to assign a reason for the several decompositions of the precipitate with sulphuric acid, and its recomposition with acetate of lead: it is enough to say that, without these processes, the mass cannot be converted into crystals.

“ Thus the whole of the original precipitate was dissolved in water; almost the whole of it crystallized, but a small portion remained in solution. The mother-waters were therefore evaporated down to one-sixth, and set by to cool: a dark-coloured precipitate, mixed with irregular crystals, was deposited, which, by other processes, was made to furnish crystals like the former. Further evaporation and similar treatment afforded a little more crystallized matter. In short, the whole of the original precipitate from apple-juice and acetate of lead was converted into crystals, except a very small portion which appeared to be neutral vegetable matter, mixed with earthy salts from the water evaporated.

“ The crystals were sorbate of lead; mere inspection by an eye familiarized to their striking appearance was sufficient to determine their nature. But, to put the matter beyond doubt, I decomposed the whole crop first by means of an insufficient quantity of sulphuric acid, and lastly by an excess of sulphuretted hydrogen. The acid thus insulated proved by its habitudes with lime, potash, soda, and magnesia, to be sorbic acid; and in this manner *the whole of the acid which exists in apples* was demonstrated to be the same as that which imparts acidity to the berries of the *Sorbus aucuparia*, a position which had been only previously assumed.

“ To conclude: the objects of the foregoing statements have been, 1st, to establish my claim to the discovery of sorbic acid; 2nd, to show that Scheele's so-named malic acid, which has been confounded with the sorbic, was not an acid *sui ge-*

neris, but a compound altogether different in its nature and properties; 3rd, to prove that the supposed identity of sorbic acid with Scheele's acid of apples was assumed on insufficient grounds; and 4th, now, for the first time, to supply the hitherto deficient evidence that the acid of apples is the same as that of sorbus berries, neither containing any other acid than the sorbic."

Rev. Charles Graves communicated some notes made by himself and Mr. Charles M'Donnell respecting the existence of various manuscripts in Ireland in the early part of the seventeenth century.

Rev. Dr. Todd presented rubbings from the monumental stones in the churchyard of the abbey of Dungiven, Co. Derry.

APRIL 22ND, 1850.

The REV. HUMPHREY LLOYD, D. D., PRESIDENT,
in the Chair.

The Secretary read the following second Report relative to the establishment of a system of meteorological and tidal observations in Ireland:

"In presenting to the Academy their Second Report relative to the establishment of a system of Meteorological and Tidal Observations in Ireland, your Council desire to state that they have given their earnest and attentive consideration to the details of the proposed measure, and especially to the plan of observation required. Before entering upon the latter, it will be necessary to advert briefly to the nature of the questions whose solution is sought. In Meteorology the following are the principal:

"1. The distribution of temperature, humidity, and rain, as af-